

Genera of the *Scirtothrips* genus-group (Thysanoptera, Thripidae) with a new species of *Siamothrips* from Malaysia

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Abstract

The *Scirtothrips* genus-group is here considered to comprise 11 genera, and an identification key to these is presented. These genera are *Ajothrips* Bhatti, *Anascirtothrips* Bhatti, *Biltothrips* Bhatti, *Cercyothrips* Morgan, *Drepanothrips* Uzel, *Ephedrothrips* zur Strassen, *Kenyattathrips* Mound, *Parascirtothrips* Masumoto & Okajima, *Scirtidothrips* Hood, *Scirtothrips* Shull and *Siamothrips* Okajima. One genus, *Sericopsotrips* Hood, is considered a **new synonym** of *Scirtothrips*, with the only species now referred to as *Scirtothrips palloris* (Hood) **comb.n.** A second species in the genus *Siamothrips* is described from Malaysia as *Siamothrips initium* **sp.n.**

Key word: *Scirtothrips* genus-group, key to genera, *Siamothrips* new species

Introduction

The *Scirtothrips* genus-group is here recognised as comprising 11 genera, of which 10 genera comprise a total of 18 species whereas 110 species are now listed in *Scirtothrips*. Of these genera, only *Scirtothrips* and *Anascirtothrips* are widespread globally, whereas the remaining nine genera are restricted in their distributions, five of them being monotypic. The members of this group of Thripinae breed on a wide range of plants, on which they appear to prefer tissues of the youngest leaves and fruitlets. Some species are of considerable economic importance as major pests, for example, of *Citrus* in South Africa (Gilbert 1990), of avocado in California (Rugman-Jones *et al.* 2007), and of various crops in Asia (Talekar 1991). Moreover, a few species have become widely distributed, probably through the horticultural trade, including *Scirtothrips dorsalis* and *Anascirtothrips arorai* (Hoddle *et al.* 2012), also *Biltothrips minutus* (Ng *et al.* 2014). A further example of such inadvertent dispersal is the description of *Kenyattathrips katherinae* based on specimens taken in quarantine at Melbourne, Australia, from leaves imported from Kenya (Mound 2009). Some pest species of *Scirtothrips* are highly polyphagous (Garms *et al.* 2013), but others have a more restricted host range, such as species associated with avocado in Central America (Hoddle *et al.* 2008a). Other taxa with a restricted host range include species of *Anascirtothrips* that seem to breed largely on the leaves of various *Ficus* trees, and the two species of *Ephedrothrips* that are known only from the leaves of *Ephedra* species (Ephedraceae).

Masumoto & Okajima (2007) provided a valuable introduction to the *Scirtothrips* genus-group, but excluded *Ajothrips* Bhatti on the basis of four character states. Of these, it is now accepted that the number of veinal setae among the species involved is greater than was known in 2007, and the absence of a dorsal split on tergite X of *Ajothrips garuda* is not true for all available specimens. The condition of the prospinasternum, the third character employed, is not visible in many slide preparations as this is a very weak sclerite, and is here not considered suitable for decisions on relationships. Thus, of the four character states, only the presence of campaniform sensilla on tergite IX in *Ajothrips* distinguishes this taxon clearly. The genus is therefore here included as a member of *Scirtothrips*-group, in which all species share the following character states, except where indicated: Body usually pale and small, less than 1 mm long. Antennae usually 8-segmented, but 7-segmented in six species and 6-segmented in one species; antennal segment I without dorso-apical setae, segment II with inner dorsal seta usually

longer than outer seta, segments III–IV with sense cone forked. Head and pronotum usually with closely spaced striae; interantennal projection relatively wide; ocellar setae pair I present (absent in *Biltothrips*). Pronotum usually without long posteroangular setae, with 4 pairs of posteromarginal setae. Tarsi 2-segmented. Fore wing first vein with setal row incomplete, second vein setal row varying from few (or zero) to many setae. Meso and metasternal endofurca usually with spinula. Abdominal tergites laterally with closely spaced rows of microtrichia (absent in *Scirtidothrips*); median pair of setae, S1, usually close together; tergite IX without campaniform sensilla (present only in *Ajothrips*); tergite X without dorsal longitudinal split (weakly present in *Ajothrips*); male without sternal pore plates, tergite IX sometimes with paired drepanae.

Nomenclatural details are available in ThripsWiki (2015). The following abbreviations and depositories are used: CPS—campaniform sensilla; ANIC—Australian National Insect Collection, Canberra. CISUKM—Centre for Insect Systematics, Universiti Kebangsaan Malaysia, Bangi. USNM—United States National Museum of Natural History. UCME—Entomology collection from Complutense University of Madrid.

Key to genera of *Scirtothrips* genus-group

1. Antennae 6-segmented *Drepanothrips*
- . Antennae 7 or 8-segmented 2
2. Antennae 7-segmented 3
- . Antennae 8-segmented 5
3. Antennae widely separated, interantennal projection wider than length of antennal segment I; first ocellar setae long, about 3 times as long as distance between posterior ocelli; pronotum with a pair of long anteromarginal setae *Kenyattathrips*
- . Antennae not widely separated, interantennal projection not wider than length of antennal segment I; first ocellar setae not elongate; pronotum with no long anteromarginal setae 4
4. Mesonotal median and submedian setae arising almost in a transverse line; abdominal tergites with many rows of closely spaced microtrichia on lateral thirds; tergal median setae S1 longer than distance between their bases *Anascirtothrips*
- . Mesonotal submedian setae arising near posterior margin, posterolateral to median setae; abdominal tergites lateral thirds with few microtrichia on sculpture lines; tergal median setae S1 shorter than the distance between their bases. *Parascirtothrips*
5. Abdominal tergites IV–VII without rows of microtrichia on lines of sculpture laterally (Fig. 4); fore wing second vein with complete row of about 16 setae. *Scirtidothrips*
- . Tergal lateral thirds with closely spaced rows of microtrichia on sculpture lines; fore wing second vein with less than 12 setae 6
6. Tergal setae S1 and S2 arise laterally closer together than their length; head with ocellar setae pair I absent, no setal pair in front of first ocellus. *Biltothrips*
- . Tergal setae S1 usually close together medially, distant from setae S2; ocellar setae pair I present, sometimes wide apart (absent in some specimens of *Scirtothrips malayensis*) 7
7. Abdominal sternites IV–VI with median two pairs of posteromarginal setae arising in front of posterior margin (Fig. 2). *Cercyothrips*
- . Abdominal sternites IV–VI with posteromarginal setae arising at margin 8
8. Tergite IX with pair of campaniform sensilla present medially *Ajothrips*
- . Tergite IX without any campaniform sensilla 9
9. Fore wing second vein without setae; pronotum trapezoidal, as long as wide (Fig. 10); sternites with complete posteromarginal comb of microtrichia; [where known, male apterous] *Siamothrips*
- . Fore wing second vein with some setae; pronotum transverse, wider than long; sternites rarely with complete posteromarginal comb of microtrichia; [where known, male macropterous] 10
10. Major setae on pronotum and fore wing tapering and sharply pointed. *Scirtothrips*
- . Major setae on pronotum and fore wing thickened, parallel-sided and bluntly pointed (Fig. 5) *Ephedrothrips*

Ajothrips Bhatti, 1967

Three species are described in this genus, all from India. Masumoto & Okajima (2007) excluded the genus from the *Scirtothrips* genus-group, but the chaetotaxy of the fore wing is similar to that of *Scirtidothrips*, and the dorsal split on tergite X is very short and not always clearly defined. The most obvious difference from the species in the other genera discussed here is the presence of a pair of campaniform sensilla medially on the ninth tergite.

***Anascirtothrips* Bhatti, 1961**

This genus currently includes four species. Associated with the leaves of various *Ficus* species, these have a natural distribution in the tropics of eastern Asia to northern Australia. However, *A. arorai* has been distributed by the horticultural trade in *Ficus* plants, and is reported from Florida (Mound & Wang 2000) and Israel (zur Strassen & Kuslizky 2007). The species differ from those of *Scirtothrips* in having seven-segmented antennae with the second segment having both dorsal setae equally developed, and the mesonotum with both the median and submedian discal setal arising far anterior to the posterior margin of this sclerite.

***Biltothrips* Bhatti, 1973**

The only species in the genus was described from India, West Bengal, but has subsequently been reported from Thailand and Malaysia (Ng *et al.* 2014) as well as the Society Islands in the Pacific Ocean (Hoddle *et al.* 2008b). However, no information is available concerning the biology and host plant of this species. Within the *Scirtothrips* genus-group it is unique in lacking ocellar setae pair I, the usual pair of pre-ocellar setae (Ng *et al.* 2014).

***Cercyothrips* Morgan, 1925**

(Figs 1–2)

The two species described in this genus were both based on single females, the type-species from Puerto Rico and the other from Trinidad. However, Mound and Marullo (1996) reported a series of both sexes from southern Brazil that apparently represent the type species, and the figures given here are of one of these females from Brazil. This genus shares with *Kenyattathrips* and *Scirtidothrips* the unusual character state of having the sternal posteromarginal setae arising in front of the margins (Fig. 2). However, the chaetotaxy in the former genus is very different as indicated below. Antennal segments VII and VIII are far more slender than those in the second genus, and the metanotum has transverse sculpture lines (Fig. 1) that are similar to those found in *Ajothrips*.

***Drepanothrips* Uzel, 1895**

The only species in this genus is presumably European in origin, but has been recorded from Russia, Japan and North America. Known as a pest of grapevines in Europe and America, although not in Japan (Masumoto & Okajima 2007), it lives on the leaves of *Corylus* and *Quercus* trees in Britain (Mound *et al.* 1976). The species is unique among the *Scirtothrips* genus-group in having the three terminal antennal segments fused to produce a six-segmented condition, and the male bears a pair of conspicuous drepanae laterally on the ninth tergite.

***Ephedrothrips* zur Strassen, 1968**

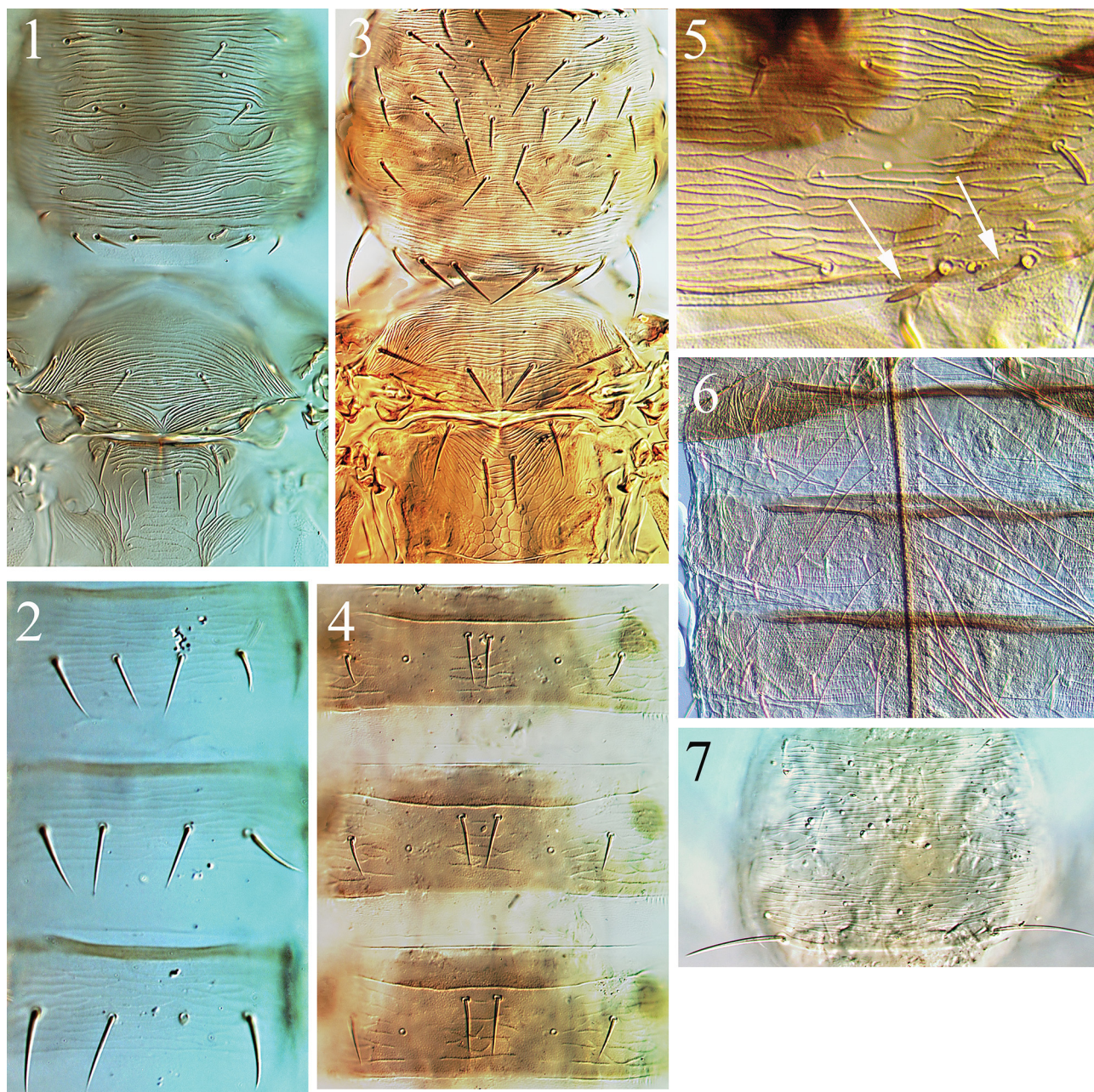
(Figs 5–6)

Two species are placed in this genus, from Morocco and Spain. These were described as having 2-segmented maxillary palps, a character state shared only with *Cercyothrips* among the genera discussed here. However, the presence or absence of a distal suture on these palps is sometimes difficult to determine, and one paratype of *E. ontigolae* (in UCME) has been studied that appears to have two segments on the right palp but three on the left palp. The form of the setae on the pterothorax (Fig. 5) and fore wings is different from that found in any other genus in the *Scirtothrips* group.

***Kenyattathrips* Mound, 2009**

The only known species in this genus was described from *Catha edulis* (Celastraceae) from Kenya but taken in

Quarantine at Melbourne, Australia. The species is unusual in having the inner pair of setae on the second antennal segment exceptionally long, ocellar setae pair I long and arising far forward on the interantennal projection, the pronotum with a pair of long anteromarginal setae, tergite VII as well as VIII with a complete marginal comb of microtrichia, and sternites V–VII with the posteromarginal setae arising in front of the margin.



FIGURES 1–7. *Cerciorthrips*: (1) pronotum, mesonotum and metanotum; (2) sternites IV–VI. *Scirtidothrips*: (3) pronotum, mesonotum and metanotum; (4) tergites III–V. *Ephedrothrips ontigolae* (paratype): (5) pronotum; (6) tergites III–V. *Scirtothrips palloris* (Hood) **comb.n.**: (7) pronotum.

***Parascirtothrips* Masumoto & Okajima, 2007**

The single described species in this genus remains known only from Honshu, Japan, where it was recorded from at least five different genera of plants, most of which are members of the Fagales or even Fagaceae. The species is unusual within the *Scirtothrips* genus-group in having the pronotal sculpture weak with widely spaced lines, the mesonotal submedian setae arising close to the posterior margin, the tergites with few rows of microtrichia, and the antennae are 7-segmented.

***Scirtidothrips* Hood, 1954**

(Figs 3–4)

This genus comprises a single species, *S. torquatus*, described from Brazil but subsequently recorded from Costa Rica (Mound & Marullo 1996). Although very similar to species placed in *Scirtothrips* in body form and the sculpture of the head and thorax, it differs in lacking microtrichia on the lateral sculpture lines of the tergites, the two dorsal setae on antennal segment II are sub-equal in length, the fore wing second vein bears a complete row of 16–17 setae, and the median two pairs of sternal posteromarginal setae arise submarginally at least on sternites V–VII. The figures given here (Figs 3, 4) are from a female in the USNM collection, taken in January 1951 at Turrialba, Costa Rica, on *Mimosa* flowers and foliage, that has been studied together with the holotype female.

***Scirtothrips* Shull, 1909**

Scirtothrips Shull, 1909: 222. Type species *Scirtothrips ruthveni* Shull.

Sericopsothrips Hood, 1936: 83. Type species *Sericopsothrips palloris* Hood. **syn.n.**

Hood described *Sericopsothrips* for a single species that remains known only from a single female, collected from blueberry flower in 1934 at Canandaigua, New York. He compared the genus to *Sericothrips*, but curiously made no reference to *Scirtothrips*. In contrast, based on the description, Stannard (1968) stated that the genus would “key to *Scirtothrips*”, although Masumoto and Okajima (2007), also Mound (2009), stated that *Sericopsothrips* could be distinguished from *Scirtothrips* by having a pair of long posteroangular setae on the pronotum. Again, however, the comments by these authors were based only on the original description. The holotype female of *palloris* has now been examined, and the pronotal setae S2 are 50 microns long (Fig. 7). This is not significantly longer than the 45 microns long setae of *S. ewarti* Bailey from western USA, nor the 30 microns long setae of the common pest species *S. citri* (Moulton). In other character states, the species *palloris* is a typical member of *Scirtothrips*, with the inner dorsal seta on antennal II conspicuously longer than the outer seta, and the genus is here placed into synonymy. The species level taxonomy of North American *Scirtothrips* species remains unsatisfactory (Hoddle *et al.* 2012), and comparisons of *Scirtothrips palloris* **comb.n.** with other species are currently not possible. However, it is a pale individual, with no obvious darker markings, the ocellar area bears widely spaced irregular transverse striae and setae pair III are closer together than the diameter of the first ocellus, the metanotum has elongate reticulation with the median setae arising far behind the anterior margin, the lateral microtrichial fields on the tergites bear three pairs of setae, and no discal microtrichia are visible on the ninth tergite; the sternites are not visible. As a result of this synonymy, *Scirtothrips* now comprises 110 species, most of which are found in the warmer parts of the world. Several species have been reported as pests on a range of important crops, including avocado, capsicum, citrus, grapes, mango, strawberry and tea (Hoddle & Mound 2003). As noted in the key above, one recently described species, *S. malayensis*, is unusual in that the holotype and several (but not all) paratypes lack ocellar setae pair I, a remarkable condition that was not noted in the original description (Ng *et al.* 2014).

***Siamothrips* Okajima, 1990**

This genus has previously included the single species *S. argus* Okajima. This was described from 78 females and nine males taken on *Solanum melongena* leaves in Thailand. A second species is described below, based on six females collected in Perak, Peninsular Malaysia.

Key to species

1. Body and wings pale; sculpture on mesoscutum and metascutum without inner markings; median and submedian setae on mesoscutum not arranged in a transverse line. *argus*
- . Body, head, thoracic segments (Figs 8–11) and fore wing with brown markings (Fig. 15); sculpture on mesoscutum and metascutum with inner markings; median and submedian setae on mesoscutum arranged in a transverse line (Fig. 11). *initium* **sp.n.**

Siamothrips initium sp.n.

(Figs 8–17)

Female macropterous. Body pale to brown, anterior margin of head brown; pronotum uniformly pale; femora, tibiae and tarsi pale, tarsi slightly shaded at extreme apex; antennal segments I–III pale, IV–V shaded in apical half, VI–VIII uniformly shaded (Fig. 12); fore wing brown at base including clavus, and middle areas (Fig. 15); abdominal tergites pale; all abdominal sternites pale including antecostal ridges.

Head wider than long; ocellar setae I present; II situated outside ocellar triangle, III arising on tangent between anterior margins of hind ocelli; two pairs of postocular setae; mouth-cone not extending beyond posterior margin of pronotum, maxillary palps 3-segmented; compound eyes without pigmented ommatidia. Antennae 8-segmented, segment I without dorsal apical setae, II without CPS and mid dorsal setae, with four rows of microtrichia dorsally; III and IV with sense cones forked; III–VI with three to four rows of microtrichia on both dorsal and ventral surfaces. Pronotum trapezoidal with about 30 fine setae, transverse striae at margins but striae irregular medially; no long posteroangular setae, 2 or 3 pairs of posteromarginal setae (Fig. 10). Mesonotum with irregular transverse striae with inner markings; no anterior CPS, median and submedian setae arranging in a transverse line. Metanotum sculpture irregular reticulate medially with inner markings, lateral area with longitudinal lines, median and submedian setae situated at anterior margin, without CPS. Mesosternum with about 23 long and fine setae, endofurca with spinula. Metasternum with about 12 long and fine setae (Fig. 14), endofurca with spinula. Fore wing first vein with 3 + 2 setae on basal half, 5 setae with distinct gap on apical half; second vein without setae; clavus with three veinal and one discal setae; posteromarginal fringe cilia weakly wavy. Tarsi 2-segmented; abdominal tergites II–VII with closely spaced rows of small microtrichia on lateral thirds, S1 setae arising close together; tergite VIII with rows of microtrichia extending across segment on anterior half, with complete posteromarginal comb (Fig. 16); tergite IX with no CPS or microtrichia. Sternites II–VII with rows of discal microtrichia across median area, at least on posterior halves, posterior margin with fringe of microtrichia; segment II with 2 pairs of long posteromarginal setae, III–VII with 4 pairs of long posteromarginal setae (Fig. 17), on VII median pair arising in front of margin.

Measurements of holotype (in microns). Distended body length 870. Head, length 57; width across cheeks 88; vertex length 8–12. Pronotum median length 100; width 126. Metascutal median setae 11; submedian setae 16. Fore wing length 430. Antennal segments I–VIII length (width): 11 (20), 28 (21), 31 (16), 35 (15), 26 (13), 39 (13), 9 (6), 11 (5).

Male unknown.

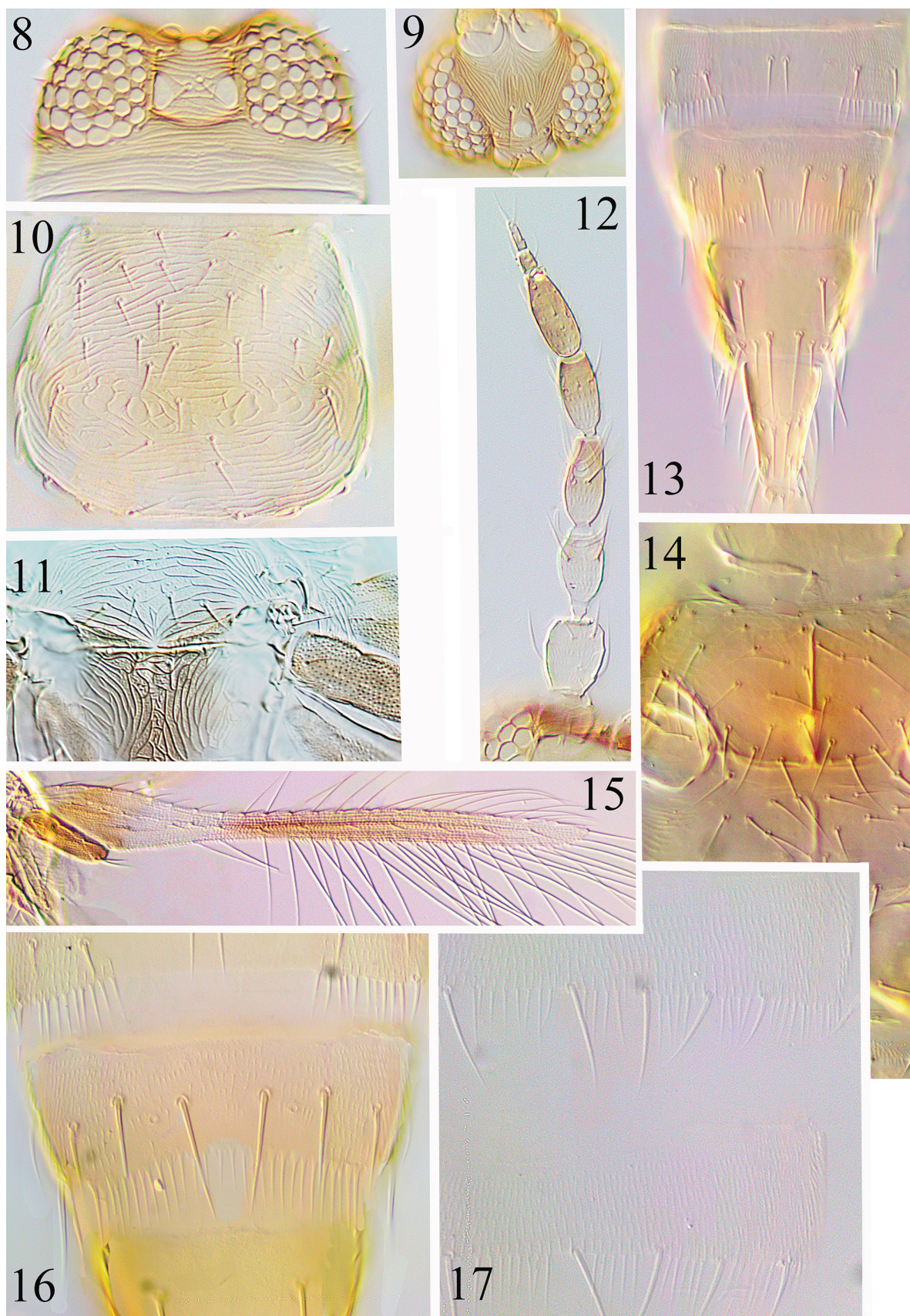
Material studied. Holotype female: **MALAYSIA**, Perak, Pulau Pangkor, on *Commersonia* sp., 2–7.v.2009 (Ng, Y.F.) (in CISUKM). Paratypes: 5 females collected with holotype (in CISUKM and ANIC).

Etymology. This species was first recognised in 2009 during a visit by the first author to the laboratory of Laurence Mound at CSIRO, Canberra. The species name *initium*, meaning “beginning”, is in reference to that commencement of our collaborative studies.

Comments. The colour of this new species is clearly different from that of *Siamothrips argus*. In contrast to the uniformly pale colour of that species, *initium* has several brown markings including the anterior margin of the head, the posterior area of the mesoscutum, the entire metascutum, and the base and middle area of the fore wing. Moreover, the arrangement of the metascutal median and submedian setae in a transverse straight line, and the inner markings to the reticulation on the meso- and metascutum are different from *argus*.

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FIGURES 8–17. *Siamothrips initium* sp.n: (8) Head, (9) frons; (10) Pronotum; (11) Mesonotum and metanotum; (12) Antenna; (13) Abdominal tergites VI–X; (14) Mesosternum and metasternum; (15) Fore wing; (16) Abdominal tergites VII–IX (close up); (17) Abdominal sternites VI–VII.

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